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Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the matter of	)	
	)	
Replacement of Part 90 by Part 88 to Revise the Private Land Mobile Radio Services and Modify the Policies Governing them	)	
	)	
and	)	PR Docket No. 92-235
	)	
Examination of Exclusivity and Frequency Assignment Policies of the Private Land Mobile Radio Services	)	

REPLY COMMENTS OF NEBRASKA PUBLIC POWER DISTRICT

Washington, D.C.
January 5, 1996

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REPLY COMMENTS OF NEBRASKA PUBLIC POWER DISTRICT

These reply comments are filed on behalf of the Nebraska Public Power District. NPPD is a public corporation and a political subdivision of the State of Nebraska. It provides wholesale and retail electric services, and its chartered territory encompasses approximately ninety-nine percent (99%) of the geographic area of the state.

Summary

Even in the absence of unanimity on consolidation among PLMR licensees, the record supports Commission adoption of liberalized inter-category sharing among governmental entities to facilitate joint mobile radio networks. Joint governmental communications systems foster more efficient use of the spectrum through

- broader financial support for speedier conversion to newer, spectral-efficient technologies; and
- reduced spectral bandwidth requirements through

- reduced spectral bandwidth requirements through
  - statistical aggregation of peak-load demand, and
  - dynamic channel load-shedding through software-driven "recapture" of channels from lower priority uses.

In addition, joint communications networks foster more effective joint relief and restoral operations during emergencies by providing inter-operability among participating entities.

Argument

I. LIBERALIZED, INTER-CATEGORY SHARING WILL PERMIT MORE EFFICIENT AND EFFECTIVE USE OF THE SPECTRUM SOONER.

Whatever the Commission's forthcoming decision on consolidation of services, the Commission should liberalize its rules governing collective use to permit multiple governmental users and allied non-governmental public service entities to operate joint radio networks. Liberalized inter-category-sharing and joint-use rules are necessary to reach the full potential for spectral efficiency and effective provision of public services.

Those parties opposing pooling[1] or liberalized sharing have failed to consider the total picture. The Commission should not allow itself to be similarly "spooked" by specters of capture by commercial providers of the spectrum allocated to public safety users.[2] In fact, modern technology allows (1) a multiplicity of governmental entities to simultaneously enjoy the operational benefits of "dedicated" virtual systems and the economies of an aggregate transmission system and, with a joint system, (2) inter-operability among multiple entities involved in a common

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1/ See, e.g., APCO's Position Paper on Radio Service Consolidation, filed November 20, 195, contending that consolidation will work only in virgin spectrum. APCO's argument overlooks the fact that refarming is intended to substantially increase the capacity of the bands below 470 mcs. See also Comments of ASSHTO at 3.

2/ See, e.g.. Comments of American Petroleum Institute at 12 favoring sharing of "excess" capacity but opposing resale; Comments of AAR at 36-37; Comments of Alarm Industry Communications Committee at 8; Comments of Weyerhauser at 5-6; Comments of PacifiCorp at 3; Comments of Boeing at 6-9.

effort to aid the public. These benefits are described in "Sharing Trunked Public Safety Radio Systems Among Federal, State, and Local Organizations," the Appendix to NTIA's report on Land Mobile Spectrum Planning Options, Special Publication 95-34 (October 1995).

Sharing of even emergency response channels is warranted by the dynamic "recapture" of channel capacity from otherwise-ineligible users in accord with public safety priorities. Through software-driven channel assignment, the larger number of channels available to users of a joint system can be dynamically reallocated among users of the common system according to prioritized needs.

A. Joint systems promote spectral efficiency.

The high ratio of peak-to-average channels required by the public safety users leads to unnecessarily high channel requirements. NTIA's recent report on Land Mobile Spectrum Planning Options, supra, recognizes this characteristic of these services at page 2-11:

> A critical element of public safety communications systems is the need to accommodate peaks in service demand that occur during multiple emergencies. There must be sufficient capacity to handle not only normal day-to-day communications needs, but also large scale emergencies such as civil disturbances, storms, major fires, earthquakes, and other natural and man-made disasters.

Joint systems produce more efficient use of the spectrum. To the extent that peak-load demands of the different public service entities vary, equivalent channel-blocking probabilities

can be achieved with fewer collective channels than the aggregate number of channels required by individual systems to achieve the same P(O). For example, the channels needed to accommodate peak-load requirements by the Highway Department in the day can be reassigned to accommodate peak-load requirements by the Police Department at night.

Individual, non-shared systems fail to take advantage of the statistical nature of blocking. In principle, the larger the number of potentially available channels per user, the lesser the probability of a call's being blocked. Two simplified numerical examples will make the potential benefit of this principle clearer.

> *Example A.* Assume two users each with an average channel requirement of 5 and a peak channel requirement of 10. To achieve a probability of blocking of less than five percent (P[05]), each user would require ten channels, or twenty in all. If the two users combine their systems and if their respective peaks are non-coincident, then the aggregate channel requirement would drop to fifteen, for a spectrum saving of 25 percent.

> *Example B.* The channel economies become more dramatic as the number of users with non-coincident peaks increases. Assume six users, each with an average channel requirement of 5 and a peak channel requirement of 10. To achieve a probability of blocking of less than five percent (P[05]), each user would require ten channels, or sixty in all. If the six users combine their systems and if their respective peaks are non-coincident, then the aggregate channel requirement would drop to thirty-five, for a spectrum saving of forty percent.

The benefits of joint use are even more spectacular if the peak-to-average ratios are higher, say 4:1, instead of 2:1. In example A, the sum of the disaggregated channel requirements

would be 40, while the channel requirements for a combined system would be 25, or a spectrum saving of nearly forty percent. In example A, the sum of the disaggregated channel requirements would be 120, while the channel requirements for a combined system would be 45, or a spectrum saving of over sixty percent.

"Recapture" of lower priority channels would improve the spectrum savings even more. Assuming that a lower level of service for five of the six users in Example B was acceptable during times of emergency, so that at peak one user had 20 channels and each of the other five users had three channels, the number of channels required by a combined system would be 3x5 + 20 = 35, and the spectrum saving (compared to 120 channels) would be over seventy percent.

B. Joint systems enhance delivery of public services.

To the spectrum-saving benefits of a combined system should be added the greater effectiveness and efficiency in the delivery of services to the public. Joint systems permit flexible inter-agency inter-operability when two or more entities are engaged in a common effort in the public interest. Through software-controlled dynamic channel assignment, all mobile units have potential access to all channels of a joint system without sacrificing security. Such inter-operability enables operational coördination among entities for more efficient and effective delivery of service.

C. Joint systems reduce communications costs.

Joint systems reduce the impact of advanced communications on governmental budgets. Because fewer channels are required in the aggregate and because separate equipment is not required for inter-operability, advanced communications systems can be installed for less total cost. Thus, the spectral efficiency which the Commission seeks can be achieved sooner, because (i) the total cost is less than the aggregate cost for separate systems and (ii) common costs can be spread among a larger number of users.

II. LIBERALIZED SHARING WILL ACCELERATE SPECTRUM EFFICIENCY.

By adopting liberalized sharing rules the Commission can advance the installation of new, more spectrum-efficient radio systems by governmental users.

By taking into account the impact on governmental budgets, the more using entities that can join in a joint system, the faster the Commission's goals of spectral efficiency can be achieved through installation of advanced communications equipment. The NTIA report observes that the public safety community has "been slow to adopt new technologies that could provide much more efficient use of the spectrum." Op. cit. at A-1. The reasons center as much on cost as any other factor. By adopting appropriate sharing rules, the interests of APCO and the other objecting parties will be advanced. The carrot would be far more effective than the stick.

III. OPTIMAL CONFIGURATION OF JOINT GOVERNMENTAL NETWORKS REQUIRES NON-RESTRICTIVE SHARING OF SUCH NETWORKS BY ALL PARTICIPATING ENTITIES.

Optimal configuration and financial support of joint governmental networks depends on the Commission's adopting flexible rules for inter-category sharing and for shared use of the joint network by non-governmental entities.

To maximize the statistical benefits of "trunking," described under Point I(A) *ante*, all users should have potential access to all radio channels at any given time, irrespective of whether the user of a channel at any given instant is eligible for licensing in the service to which that particular channel is allocated or not. Any categorical restrictions would require additional channels and reduce the system load factor -- foreclosing achievement of maximal spectral efficiency.

Lower-priority ineligibles should be permitted access to all radio channels in the joint network on a pre-emptible basis.[3] Because their use would be subject to pre-emption by higher priority uses,[4] such conditional use would not evade the purpose

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3/ UTC supports allowing private system licensees to lease reserve capacity on "a priority-interruptible basis". UTC Comments at 19.

4/ LMCC's non-unanimous opposition to "resale of excess capacity", LMCC Comments at 18, and UTC's proposal to restrict both the "lease of reserve capacity" and interservice sharing "from a higher-ranked service to a lower ranked service, but not *vice versa*", UTC Comments at 10, 19, 29, overlook the recapture mechanism as a mechanism for more efficient spectrum utilization by allowing resale or sharing both "up" and "down" the priority scale. LMCC, however, would not "preclude ... non-profit cooperative use systems", LMCC Comments at 18 n.15, a category broad enough to encompass the governmental joint use

of the Commission's categorization rules. The number of higher category channels would still be sized by present and future channel requirements of the higher category users. There would be no "excess" capacity in the reuse of unused capacity. The reserve capacity created thereby would be more fully utilized on an instantaneous basis during emergency and non-emergency conditions, thereby reducing the aggregate demand on the spectrum.

The Commission should avoid imposing financial restrictions on such joint governmental networks, i.e., the Commission should not inquire into the formulae for apportionment of either the joint capital costs or the joint operational costs of the joint system, nor should it attempt to limit the joint systems' charges to non-governmental users subject to pre-emption.

The Commission should not impose restrictions on the entity to whom the network is to be licensed. Different organizational forms will be more salutary in various cases, responding to different factors such as bonding limitations, procurement protocols, and legal limitations on inter-jurisdictional contracts. The Commission can fairly satisfy the concerns of those comments hostile to achieving spectrum economy through sharing by requiring the applicant to demonstrate the comparability of high-category spectrum requested to the system's high-category use projected on a long-term basis.

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systems supported by NPPD. See also Sprint-United and -Centel Comments at 5 (CMRS status).

Conclusion

The Commission should reject the arguments offered in opposition to greater spectral efficiency through inter-category sharing and joint use and instead should adopt liberalized rules authorizing joint governmental networks.

Respectfully submitted,

NEBRASKA PUBLIC POWER DISTRICT
P.O. Box 499
Columbus, Nebraska 68601

By: _____
William Malone
MILLER, CANFIELD, PADDOCK
and STONE
1225 Nineteenth Street, N.W.
Suite 400
Washington, D.C. 20036-2420
(202) 785-0600

and

Harold L. Hadland
Office of General Counsel
P.O. Box 499
Columbus, Nebraska 68601

Its Attorneys

January 5, 1996

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Certificate of Service

I hereby certify that I have caused to be mailed this day copies of the foregoing reply comments to the following persons:

Paul G. Lorenzini
Senior Vice President
PacificCorp
920 S.W. Sixth Avenue
Portland, OR 97204

Sam Nuchia
Chief of Police
City of Houston Police Dept.
61 Riesner Street
Houston, TX 77002

Edwin F. Kemp
General Director, Telecom.
Wireless Systems Engineering
Union Pacific Railroad Co.
1416 Dodge Street, Rm. 230
Omaha, NE 68179-0230

Edwin F. Kemp
General Director, Telecom.
Wireless Systems Engineering
Missouri Pacific Railroad Co.
1416 Dodge Street, Rm. 230
Omaha, NE 68179-0230

David J. Hensing
Deputy Executive Director
AASHTO
444 N. Capitol Street, N.W.
Suite 249
Washington, DC 20001

Thomas C. McMurray
Vice President Maintenance
Burlington Northern
Santa Fe Corp.
777 Main Street, 16th Floor
Fort Worth, TX 76102

Wayne V. Black, Esq.
For American Petroleum Institute
KELLER & HECKMAN
1001 G Street, N.W.
Suite 500 W
Washington, DC 20001

Jeffrey H. Olson, Esq.
For Nippon Telegraph & Telephone Company
Paul, Weiss, Rifkind, Wharton & Garrison
1615 L Street, NW, Ste. 1300
Washington, DC 20036

Henrietta Wright, Esq.
W. Kenneth Ferree, Esq.
For LoJack Corporation
Goldberg, Godles, Wiener & Wright
1229 19th Street, N.W.
Washington, DC 20036

Henry Goldberg, Esq.
Jonathan L. Wiener, Esq.
For Hewlett-Packard Company
Goldberg, Godles, Wiener & Wright
1229 19th Street, N.W.
Washington, DC 20036

Mr. Anthony H. Foster
Vice President
Computer & Communication
Canadian Pacific Railway System
40 University Ave., Ste. 1200
Toronto, Ontario M5-J1T1

Samuel E. Baum, P.E.
Division Engineer
Communications Engineering
N.Y.C. Transit Authority
1350 Avenue of the Americas
New York, NY 10019

Mr. David Galentine
Manager, Wireless
Weyerhaeuser Company
Tacoma, WA 98477

Mr. Robert M. Hoffman
General Supervisor,
Communications
Norfolk Southern
Lake Division
8111 Nelson Road
Fort Wayne, IN 46803

Mark S. Hoffman, Esq.
General Counsel
CSX Transportation, Inc.
500 Water Street, J150
Jacksonville, FL 32202

John A. Prendergast, Esq.
For American Automobile
Association
Blooston, Modkofsky, Jackson &
Dickens
2120 L Street, NW., Ste. 300
Washington, DC 20037

John A. Prendergast, Esq.
For Alarm Industry
Communications Committee
Blooston, Modkofsky, Jackson &
Dickens
2120 L Street, NW., Ste. 300
Washington, DC 20037

David C. Jatlow, Esq.
For The Ericsson Corporation
Young & Jatlow
2300 N Street, N.W., Ste. 600
Washington, DC 20037

Jay C. Keithley, Esq.
Nancy R. McCabe, Esq.
For United & Central
Telephone Companies
1850 M Street, N.W.
Washington, DC 20036

Mr. Frederick C. Ohly
Associate General Counsel
AMTRAK
Nat'l Railroad Passenger
Corporation
60 Massachusetts Ave., N.E.
Washington, DC 20002

Robert B. Kelly, Esq.
For Securicor Radiocoms Ltd.
KELLY & POVICH, P.C.
1101 30th Street, N.W.
Suite 300
Washington, D.C. 20007

Lawrence R. Sidman, Esq.
Verner, Lupert, Bernhard
McPherson & Hand, Chtd.
for The American Automobile
Association
901 15th Street, NW, Ste. 700
Washington, DC 20005

Jeffrey L. Clarke, Esq.
Counsel & Technical Advisor
Office of Government Relations
Counsel
American Gas Association
1515 Wilson Boulevard
Arlington, VA 22209

Mr. Alan R. Shark, President
American Mobile
Telecommunications
Association, Inc.
1150 18th Street, N.W.
Suite 250
Washington, DC 20036

Mr. Mark J. Golden
Vice President, Regulatory
Personal Communications
Industry Association
1019 19th Street, NW,
Ste. 1100
Washington, DC 20036

Mr. Mark E. Crosby
President & CEO
Industrial Telecommunications
Association, Inc.
1110 N. Glebe Rd., Ste. 500
Arlington, VA 22201

Lawrence R. Sidman, Esq.
Verner, Lupert, Bernhard
McPherson & Hand, Chtd.
for The Association of
American Railroads
901 15th Street, NW, Ste. 700
Washington, DC 20005

Wayne, V. Black, Esq.
KELLER AND HECKMAN
For American Petroleum Inst.
1001 G Street, N.W.
Suite 500 West
Washington, DC 20001

William K. Keane, Esq.
for Internat'l Taxicab &
Livery Association
WINSTON & STRAWN
1400 L Street, N.W.
Washington, DC 20005

Jeffrey H. Olson, Esq.
For Spacelabs Medical, Inc.
Paul, Weiss, Rifkind, Wharton
& Garrison
1615 L Street, NW, Ste. 1300
Washington, DC 20036

George Petrustsas, Esq.
For Forest Industries
Telecommunications
Fletcher, Heal & Hildreth
1300 N. 17th Street, 11th Fl.
Rosslyn, VA 22209

William K. Keane, Esq.
for Manufacturers Radio
Frequency Advisory
Committee, Inc.
Winston & Strawn
1400 L Street, N.W.
Washington, DC 20005-3502

John L. Bartlett, Esq.
Karen A. Kincaid, Esq.
For Aeronautical Radio, Inc.
Wiley, Rein & Fielding
1776 K Street, N.W.
Washington, DC 20006

Martin W. Bercovici, Esq.
For Internat'l Municipal
Signal Association
KELLER & HECKMAN
1001 G Street, N.W.
Suite 500 West
Washington, DC 20001

Martin W. Bercovici, Esq.
For Internat'l Association of
Fire Chiefs, Inc.
KELLER & HECKMAN
1001 G Street, N.W.
Suite 500 West
Washington, DC 20001

David Flinkstrom, President
Mark E. Crosby, Acting
Secretary/Treasurer
Land Mobile Communications
Council
1110 N. Glebe Road, Ste. 500
Arlington, VA 22201

Joseph P. Markowski, Esq.
Brian J. McHugh
For The Boeing Company
Squire, Sanders & Dempsey
1201 Pennsylvania Ave., N.W.
P.O. Box 407
Washington, DC 20044

Jeffrey L. Sheldon, Esq.
Sean A. Stokes, Esq.
Thomas E. Goode, Esq.
For UTC
1140 Connecticut Ave., NW,
Suite 1140
Washington, DC 20036

Raymond A. Kowalski, Esq.
KELLER & HECKMAN
For Schlumberger Meter
Communications Systems and
The American Trucking
Associations, Inc.
1001 G Street, N.W.
Suite 500 W
Washington, DC 20001

Robert M. Gurss, Esq.
For Association Public-Safety
Communications Officials-
International, Inc.
Wilkes, Artis, Hedrick & Lane
1666 K Street, NW, Ste. 1100
Washington, DC 20006

Mr. Leonard S. Kolsky
Ms. Janet C. Ernest
Motorola, Inc.
1350 I Street, N.W.
Washington, DC 20005

William Malone

Washington, D.C.
January 11, 1996